

CLAIMS

What is claimed is:

- 1 1. A frequency converter comprising:
 - 2 first, second, third and fourth mixers, each receiving a
 - 3 signal to be frequency converted;
 - 4 first, second and third quadrature dividers, each
 - 5 quadrature divider receiving an input signal and providing an
 - 6 inphase and a quadrature component of the respective input
 - 7 signal;
 - 8 the first quadrature divider receiving an oscillator
 - 9 signal and providing inphase and quadrature components of the
 - 10 oscillator signal as inputs to the second and third
 - 11 quadrature dividers, respectively;
 - 12 the inphase and quadrature component outputs of the
 - 13 second quadrature divider providing signals to pump the
 - 14 second and first mixers, respectively;
 - 15 the inphase and quadrature component outputs of the
 - 16 third quadrature divider providing pumping signals to the
 - 17 fourth and third mixers, respectively;
 - 18 the first and fourth mixers providing quadrature
 - 19 components for combining to provide a quadrature frequency
 - 20 converter output; and,

21 the second and third mixers inphase and out-of-phase
22 components, respectively, for combining to provide an inphase
23 frequency converter output.

1 2. The frequency converter of claim 1 wherein the
2 mixers and the quadrature dividers are formed as part of a
3 single integrated circuit.

1 3. The frequency converter of claim 2 wherein the
2 mixers are fabricated by replication of the same mixer
3 circuit.

1 4. The frequency converter of claim 2 wherein the
2 quadrature dividers are fabricated by replication of the same
3 quadrature divider circuit.

1 5. The frequency converter of claim 2 wherein the
2 mixers and quadrature dividers are fabricated by replication
3 of the same mixer and quadrature divider circuits,
4 respectively.

1 6. The frequency converter of claim 1 further
2 comprised of a quadrature combiner coupled to the output of
3 the mixers.

1 7. The frequency converter of claim 1 wherein the
2 signal to be converted is an RF signal.

1 8. The frequency converter of claim 7 wherein the
2 mixer outputs are baseband signals.

1 9. The frequency converter of claim 1 wherein the
2 oscillator is a local oscillator.

1 10. A method of frequency conversion comprising:
2 providing four signals to pump four mixers, the four
3 pumping signals being respective outputs of two quadrature
4 dividers, each having as an input, a respective output of a
5 third quadrature divider receiving an oscillator signal as an
6 input;
7 providing a frequency to be converted to all four
8 mixers; and,
9 combining the outputs of two pairs of the four mixers to
10 provide the inphase and the quadrature components of the
11 frequency converted signal.

1 11. The method of frequency conversion of claim 10
2 wherein the mixers and the quadrature dividers are formed as
3 part of a single integrated circuit.

1 12. The method of frequency conversion of claim 11
2 wherein the mixers are fabricated by replication of the same
3 mixer circuit.

1 13. The method of frequency conversion of claim 11
2 wherein the quadrature dividers are fabricated by replication
3 of the same quadrature divider circuit.

1 14. The method of frequency conversion of claim 11
2 wherein the mixers and quadrature dividers are fabricated by
3 replication of the same mixer and quadrature divider
4 circuits, respectively.

1 15. The method of frequency conversion of claim 10
2 further comprised of a quadrature combiner coupled to the
3 output of the mixers.

1 16. The method of frequency conversion of claim 10
2 wherein the signal to be converted is an RF signal.

1 17. The method of frequency conversion of claim 16
2 wherein the mixer outputs are baseband signals.

1 18. The method of frequency conversion of claim 10
2 further comprising generating the oscillator signal using a
3 local oscillator.